

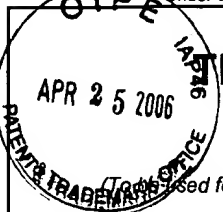
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Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

PTO/SB/21 (12-97)

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# TRANSMITTAL FORM

(To be used for all correspondence after initial filing)

Application No.	09/763,214
Filing Date	February 2, 2001
First Named Inventor	Xuekui Lan
Group Art Unit	1762
Examiner Name	K. Bareford
Attorney Docket Number	VALMET-5210

Total Number of Pages in This Submission

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Remarks

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## SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Patrick J. G. Stiennon, Reg. No. 34934
Signature	<i>Patrick J. G. Stiennon</i>
Date	April 19, 2006

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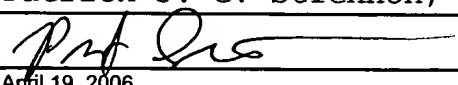
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<b>TRANSMITTAL FORM</b> (To be used for all correspondence after initial filing)	Application No.	09/763,214
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## UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

PATENT NO : 7,022,380  
DATED : April 4, 2006  
INVENTOR(S): Xuekui Lan et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In column 3, line 41 of the issued patent, delete the comma after the word "backing"

In column 10, line 25 of the issued patent, "recirculation a" should be written --a recirculation--

MAILING ADDRESS OF SENDER:

PATENT NO. 7,022,380

STIENNON & STIENNON  
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In The United States Patent And Trademark Office

Applicant: Xuekui Lan et al. Date: April 19, 2006  
Date Filed: February 2, 2001 Docket No.: VALMET-5210  
App. No.: 09/763,214 Art Unit: 1762  
Patent No.: 7,022,380 Issue Date: April 4, 2006  
For: Method and Apparatus for the Examiner: K. Bareford  
High Speed Application of  
Coating to a Traveling Paper Web

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Name of applicant, assignee or Registered Representative

**Request for Certificate of Correction  
With Expedited Processing**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Applicant requests that a Certificate of Correction be issued as shown on the PTO/SB/44  
enclosed herewith.

This request for correction is incurred solely through the fault of the United States Patent  
and Trademark Office, as is clearly disclosed in the records of the Office. The accompanying  
documentation unequivocally supports this assertion of USPTO error, and includes copies of the

Applicant: Xuekui Lan et al.  
Application No.: **09/763,214**  
Art Unit: 1762

relevant pages of the record, so that this request may be processed without the file. The relevant sections of the record have been highlighted in yellow.

Expedited processing is requested under the provisions of the August 21, 2002, Official Notice in 1262 TMOG 96.

Applicant respectfully requests that the typographical errors in the text of the published patent that were not in the original application be corrected by a Certificate of Correction under 37 CFR 1.322.

In column 3, line 41 of the issued patent, delete the comma after the word "backing," as written in the application dated February 2, 2001, on page 5, line 1.

In column 10, line 25 of the issued patent, "recirculation a" should be written --a recirculation-- as written in the Examiner's Amendment dated December 13, 2005, on page 2, line 13.

Applicant believes that these Office mistakes include at least one error of consequence that merits the issuance of a Certificate of Correction as it is of such a nature that the intended meaning may not be obvious from the context.

Respectfully submitted,



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Relevant pages from printed U.S. Patent No. 7,022,380

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relatively high speeds, are obviated by this invention. In this invention, a flow loop is established within the coater head where a fresh supply of an aqueous slurry of coating material is brought into the coater head and is directed into a mixing chamber. In a preferred embodiment, a plurality of flow-metering orifices also link a recirculation channel within the coater head in fluid communication with the mixing chamber. A feed channel is in fluid communication with the mixing chamber, downstream thereof, for receiving the aqueous slurry of coating material from the mixing chamber. The feed channel leads toward the backing roll.

Near the end of the feed channel, the aqueous slurry is divided into two portions comprising, in a preferred embodiment, a major portion which travels downstream into a coating chamber and a minor portion which is urged by the hydraulic pressure in the feed channel to flow upstream over the edge of a baffle against the movement of the paper web traveling into the coater head.

The flow of the aqueous slurry in the coating chamber may utilize a blade, which preferably is relatively flexible and which forms the coating chamber, in a preferred embodiment, into a converging channel extending downstream in the machine direction. Alternatively, the coating chamber may not utilize such a flexible blade. In the case where no flexible blade is utilized, the coating chamber is defined between a relatively rigid stabilizer surface of the coater head extending downstream from the feed channel, and the surface of the backing roll. In operation of the coater embodiment, of course, the backing roll surface is covered by the paper web supported against the rotating backing roll. Therefore, for purposes of defining the side of the coating chamber against the backing roll, this side/surface is intended to include the backing roll with or without the paper web supported by the backing roll.

Whether or not a blade is used, a recirculation channel is formed in the coater head either on the side of the flexible blade facing away from, the backing roll or, in the case where no blade is utilized, the recirculation channel is more distantly spaced radially from the outer surface of the backing roll (metering size press) embodiment, or from the paper web over the backing, roll (coater embodiment) and perhaps even partially located somewhat beneath the relatively rigid stabilizer surface. The recirculation channel is maintained in fluid communication with the mixing chamber preferably through a plurality of flow metering orifices.

Thus, a looped flow path is established for the aqueous slurry to flow in the same direction as the direction of travel of the paper web and/or the rotation of the backing roll which, in the coater embodiment, supports the paper web on one side of the coating chamber. This arrangement utilizing recycled coating from the recirculation channel facilitates flow through the coating chamber without requiring an increased flow of fresh coating material into the coater head, particularly in an amount commensurate with the increased speed of paper web travel. A serendipity effect of this arrangement is that the flow of the aqueous slurry in the upstream direction over the baffle can simultaneously be maintained at a high enough volume sufficient to prevent the flow of air traveling with the surface of the backing roll (metering size press embodiment) or of the uncoated paper web (coater embodiment) from entering the coating chamber, or at least entering in an amount sufficient to deleteriously affect the condition of the coating operation as it pertains to skip coating and non-uniform streaks in the coated paper product.

Downstream of the coating chamber is a metering rod which is held in a rod holder in biased nipping engagement

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against backing roll surface, or the surface of the paper web supported over the surface of the backing roll. In a preferred embodiment, this round rod is rotated in a direction such that its surface moves counter to the direction of the backing roll surface/traveling paper web. This smooths, or meters, the coating on the outer surface of either the backing roll or the paper web traveling through the application chamber as well as helps create some hydraulic over-pressure in the recirculation channel for urging coating material passing out of the coating chamber into the recirculation chamber and through the flow-metering orifices for recirculation.

It is this recirculation which permits the coating function to be effected at relatively higher speeds without requiring larger pumps to supply the aqueous slurry of coating material to the coater head, or a greater supply of the aqueous slurry of coating material, or both, in order to provide the desired results.

The invention can be used to improve the coating quality and increase the coating speed in both coater and size press operations. In coater operations, the coating is directly metered onto the paper web wrapping the backing roll. The invention will lead to a uniform coating application on the paper web without skip coating at high speed. In size press operations, the coating is metered onto the backing roll. The invention will ensure a uniform coating film on the backing roll without skip coating at high speed, which film is eventually transferred into a high quality coating on the paper web.

Accordingly, it is an object of this invention to provide an improved coating apparatus for coating a paper web traveling at relatively high speeds.

A feature of this invention is the provision of coating apparatus having a continuous, looped flow path within a coater head for recirculating a portion of the coating within the coater head.

Another feature of this invention is the provision of coating apparatus wherein the recirculation of a portion of the coating to be combined with fresh coating entering the inlet of a coater head.

Still another feature of this invention is the provision of coating apparatus which utilizes recirculation of a first portion of the coating, and utilizes a second portion of the coating to effectively seal a traveling paper web from air being entrained in the coating.

These, and other objects, features and advantages of this invention will become apparent to those skilled in the art upon reading the description of the invention and preferred embodiments in conjunction with the attached drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view in section, shown somewhat schematically, of a known configuration for a metering size press type of coater.

FIG. 2 shows streamline patterns for the conventional metering size press of the type shown in FIG. 1.

FIG. 3 is a side elevational view in section, shown somewhat schematically, of a preferred embodiment of the coating apparatus of this invention which utilizes a blade in the coating chamber.

FIG. 4 is a view of the streamline patterns of the coating flowing through the coating apparatus shown in FIG. 3.

FIG. 4A is a view of the streamline patterns of the coating flowing through the coating apparatus similar to that shown in FIG. 3, but without the blade

FIG. 5 is a side elevational view of another embodiment of the metering size press, or coater, of this invention, shown

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flowing a coating flow from the mixing chamber in a converging flow into, and through, a feed channel in the coater head;

dividing the coating exiting the feed channel into a first portion constituting a major part of the flow from the mixing chamber and a second portion constituting a minor part of the flow from the mixing chamber;

directing the first portion into a coating chamber in the coater head, and directing the second portion in an upstream direction over a baffle disposed in spaced adjacency with either the paper web supported on the backing roll, or the surface of the backing roll, to define a gap therebetween, the second portion being sufficient to seal the gap from air moving with either the traveling paper web or the surface of the backing roll;

flowing the coating in the coating chamber in the downstream direction therein while maintaining a pressurized interface between the coating material and the paper web, when the paper web is supported on the surface of the backing roll to coat the paper web with the film of coating, or maintaining a pressurized interface between the coating material and the surface of the backing roll when the paper web is nipped against the surface of the backing roll downstream of the interface to coat the paper web with the film of coating;

flowing coating from the coating chamber into a recirculation chamber;

directing all the coating from the recirculation chamber into the mixing chamber through a plurality of flow-metering orifices formed in the coater head which are aligned parallel with one another in the cross-machine direction and which connect the recirculation chamber with the mixing chamber, the direction of flow of coating from the recirculation chamber through the plurality of flow-metering orifices being at an acute angle to the direction of flow of the fresh supply of coating being directed into the mixing chamber through the plurality of parallel holes; and

mixing the coating from the recirculation chamber with the fresh coating in the mixing chamber.

2. The method of claim 1 further comprising the step of metering the film of coating against the surface of the backing roll or the paper web moving in a first direction, with a metering rod, the metering rod having a rod surface which engages along a contact line the backing roll or paper web on the backing roll, so that the rod surface at the contact line moves in a direction opposite that of the backing roll or the paper web at the contact line.

3. Apparatus for coating a traveling paper web with a film of coating, the apparatus operatively associated with an adjacent backing roll and comprising, in combination:

- a coater head having an inlet for receiving a supply of fresh coating;
- a mixing chamber in the coater head in fluid communication with the inlet for receiving the supply of fresh coating;
- a feed channel in the coater head in fluid communication with the mixing chamber for receiving coating from the mixing chamber;
- a baffle mounted in the apparatus and operatively associated with the feed channel and having an edge

disposed in spaced adjacency with the surface of the backing roll, and substantially parallel thereto, so as to form an overflow gap with either the paper web surface to be coated, when the web is supported on the backing roll surface, or the backing roll surface, when the paper web is not supported on the backing roll surface, and to provide for the escape of coating therethrough when coating is flowed through the feed channel;

- a coating chamber in the coater head in fluid communication with the feed channel, and so constructed and arranged as to be open toward the backing roll for applying a film of coating to either the paper web surface to be coated, when the web is supported on the backing roll surface, or on the backing roll surface, when the paper web is not supported on the backing roll surface;

recirculation means in the coater head, and in fluid communication with the coating chamber and the mixing chamber for returning coating from the coating chamber to the mixing chamber to be combined with the fresh coating, and to establish, together with the feed channel, a continuous flow loop for circulation of coating within the coater head;

the recirculation means including a plurality of flow-metering orifices linking recirculation a channel with the mixing chamber, said orifices being so constructed and arranged as to form an acute angle with the inlet; and

- a flexible blade mounted to a surface of the coater head at a proximal end so that the flexible blade is only supported at the proximal end and having a distal end extending downstream therein, and defining, with the surface of the backing roll, the coating chamber on one surface of the blade, and defining, with the coater head, the recirculation channel on the other surface of the blade.

4. The apparatus for coating a traveling paper web of claim 3, wherein:

- the coater head includes a stabilizer surface for defining a part of the coating chamber for assisting in the flow of coating downstream and against either the surface of the paper web to be coated or on the surface of the backing roll.

5. The apparatus for coating a traveling paper web of claim 3, further comprising:

- a metering rod holder mounted in the apparatus for holding a rotatable metering rod for nipping engagement with either the coated paper web or the surface of the associated backing roll downstream of the coating chamber; and
- a metering rod rotatably mounted in the metering rod holder.

6. The apparatus for coating a traveling paper web of claim 5, further comprising:

- drive means operatively connected to the metering rod for rotating the metering rod while the metering rod is in nipping, coating metering engagement with the coating material against either the coated web or the surface of the backing roll.

\* \* \* \* \*



Relevant page from originally filed U.S. Application No. 09/763,214

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the backing roll (coater embodiment) and perhaps even partially located somewhat beneath the relatively rigid stabilizer surface. The recirculation channel is maintained in fluid communication with the mixing chamber preferably through a plurality of flow metering orifices.

Thus, a looped flow path is established for the aqueous slurry to flow in the same direction as the direction of travel of the paper web and/or the rotation of the backing roll which, in the coater embodiment, supports the paper web on one side of the coating chamber. This arrangement utilizing recycled coating from the recirculation channel facilitates flow through the coating chamber without requiring an increased flow of fresh coating material into the coater head, particularly in an amount commensurate with the increased speed of paper web travel. A serendipity effect of this arrangement is that the flow of the aqueous slurry in the upstream direction over the baffle can simultaneously be maintained at a high enough volume sufficient to prevent the flow of air traveling with the surface of the backing roll (metering size press embodiment) or of the uncoated paper web (coater embodiment) from entering the coating chamber, or at least entering in an amount sufficient to deleteriously affect the condition of the coating operation as it pertains to skip coating and non-uniform streaks in the coated paper product.

Downstream of the coating chamber is a metering rod which is held in a rod holder in biased nipping engagement against backing roll surface, or the surface of the paper web supported over the surface of the backing roll. In a preferred embodiment, this round rod is rotated in a direction such that its surface moves counter to the direction of the backing roll surface/traveling paper web. This smooths, or meters, the coating on the outer surface of either the backing roll or the paper web traveling through the application chamber as well as helps create some hydraulic over-

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Relevant page from Examiner's Amendment dated December 13, 2005 in U.S. Application No. 09/763,214,

2005

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in telephone interviews with Patrick Stiennon on December 1, 2005.

The application has been amended as follows:

#### IN THE ABSTRACT:

A new abstract is provided on the separate, attached page.

#### IN THE CLAIMS:

Claim 1 is canceled.

Claim 3, line 1, "claim 1" is deleted, and - claim 4 - is inserted in its place.

Claim 4, line 26, after "orifices linking a", -- recirculation-- is inserted.

Claim 4, last line, "a" is deleted, and - the -- is inserted in its place.

Claim 8, line 1, "claim 1" is deleted, and - claim 4 - is inserted in its place.

Claim 10, line 23, after "the paper web", -- with the film of coating - is inserted.

Claim 10, line 25, after "the paper web", -- with the film of coating - is inserted.

~~Wb~~ Claim 10, line 26, ~~after~~ "the" (first occurrence) is deleted.

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